

## Section by Section Focus

FY14 CL-IRAD Poster Session  
TechPort Data Template  
10/3/14

### ADD-ON CARD

START TRL: \_\_\_3\_\_\_ FINISH TRL: \_\_\_4\_\_\_

- **TAB NUMBER(S):**

- TA 12.1.1 Lightweight Structure
- TA 12.2.1 Lightweight Concepts
- TA 12.2.5 Innovative Multifunctional Concepts

**HAT NUMBER(S):** 12.1, 12.2 Inflatable: Structures & Materials for Inflatable Modules

**FTE (#):** 2 at JSC

**PROCUREMENT (\$):** \$50k

**LEVERAGED RESOURCES:** Creep testing co-funded by BEAM, and JSC ES

**MSC NUMBER:**

**CO-DEVELOPERS:** NASA LaRC, JSC, and ARC.

**TAKE-AWAY:** NASA Inflatable Structures development is moving beyond BEAM and Transhab technology to provide lightweight habitable structures with more capabilities and longer life for future exploration missions.

## POSTER

**TITLE:** Lightweight Materials and Structures – Inflatable Structures Technology Development

**Project Management:** Lynn Bowman (LaRC),

**JSC Lead:** Molly Selig

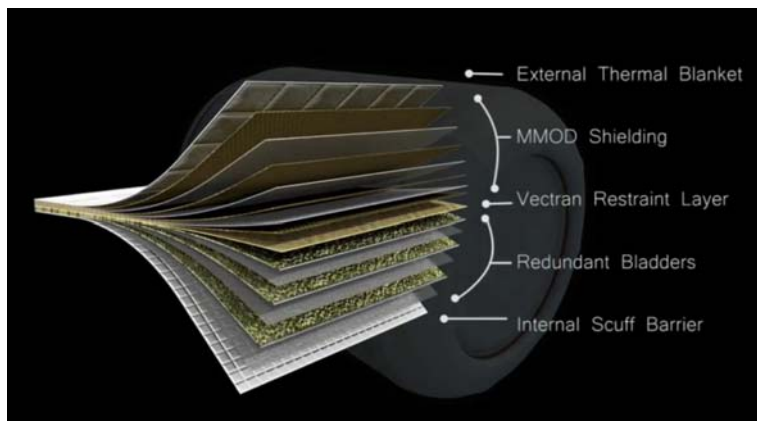
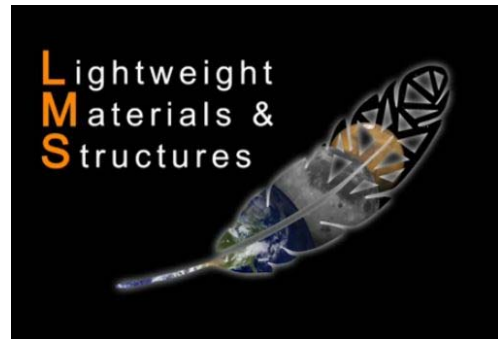
**OVERVIEW:** Inflatable Structures are a solution to the mass and volume constraints for exploration missions.

- Minimalistic Airlock Soft Hatch
  - Developing an ultra-compact airlock by eliminating the need for a large metallic bulkhead and hatch.
  - Enabling EVA capability on missions which cannot afford to carry a traditional metal airlock (EAM, Orion, ARM, etc.)
  - Outcome: Design, pressurized testing, demonstration
- Advanced Materials
  - Investigating inflatable bladder materials that are flexible and durable at extreme cold temperatures
  - Eliminating the need for heavy, power-hungry heaters to protect polymers before deployment
  - Outcome: Cold temperature flexure testing
- Restraint Material Creep Testing
  - Establishing the long term properties and end of life behavior of the structural restraint materials
  - Improving structural reliability and allowing tighter design limits that reduce restraint layer weight
  - Outcome: Strap level creep test data and analysis of creep burst test data

**INNOVATION:** NASA development will move beyond BEAM and Transhab technology to provide lightweight habitable structures with more capabilities and longer life.

**INFUSION:** Airlocks and habitats for EAM, AES, ARM, etc.

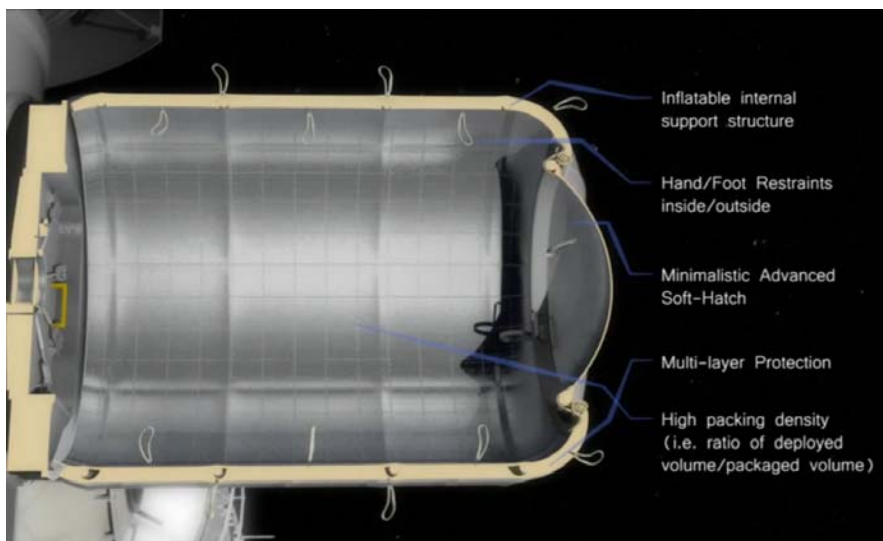
**PARTNERSHIPS:** Lightweight Materials and Structures is a partnership between Langley Research Center, Johnson Space Center, and Ames Research Center.



Layers of an Inflatable Structure



EAM Inflatable Airlock packaged for launch



Inflatable Airlock deployed

## **JSC Technology Stakeholders**

### **Customers:**

- Missions
  - National
    - NASA
    - Commercial Cargo
    - Commercial Crew
    - Commercial Space (including launch operations, satellites & servicing, space tourism, etc.)
  - International
    - ISECG
    - Commercial Space
- Programs and Major Projects
- Testbeds, Facilities, and Other Intermediaries
- Societal
  - Industrial
  - Business

### **Collaborators:**

- Other NASA centers and Headquarters
- Other federal labs
- Other federal agencies
- Academia
- Research organizations
- International space agencies or businesses

### **Sponsors:**

- JSC Center Director
- OCT
- STMD
- OCE
- HEOMD/SMD/ARMD
- U.S. Congress
- Administration (including OMB, & OSTP)
- General Public